

Blood-Stream Infection (CDC)

From: Pete Gordon [pgordon@germgardlighting.com]
Sent: Thursday, November 05, 2009 6:40 AM
To: Blood-Stream Infection (CDC)
Cc: CDC-INFO
Subject: Public Comment / Input on Draft HICPAC/CDC Catheter-Related Infections recommendations

CDC:

My understanding is that the most basic thesis of infection prevention is that the most important surfaces to keep sanitized are the surfaces of the bare hand or gloved hand. This is most certain way to limit cross contamination. These recommendations need to OVER EMPHASIZE that just prior to touching the patient or handling medical devices that will be inserted into the patient the hands MUST BE SANITARY, better yet, STERILE.

Surfaces are constantly compromised by the patient, the nurse or doctor, the patients surround etc. Cross contamination is the root cause, and transmission of pathogens to the patient causes infection. This has been enunciated by the CDC. There is even a video on its hand hygiene website that clearly enunciates this thesis. However, they did not advise a technology capable of enabling this. I believe that UVC is the technology that can enable effective hand hygiene at the point of care, at the moment of inserting catheters.

As the CDC could envision, a UVC based unit could be a small portable box that is plugged in but could also operate on batteries if required for portability. The cover opens up automatically and the healthcare worker places both hands in the box which then closes automatically around the forearm. The hands within the box are spread fingered automatically. Once the cover closes the UVC goes on and would stay on for 3 seconds, the proven time needed to sanitize the entire surface of the bare hand or gloved hand. The cover then opens and the hands are removed. When the UVC comes on the box is completely closed and no UVC enters the room. There will be automatic means to ID and record the user thereby partly resolving the issue of 'is it being used'. However, it will not record if it is being used every time the HCW is about to touch the patient as CDC recommends and enunciated in its hand hygiene video.

During the 3 second exposure the integrated UVC dose will be ~ 1200 joules per meter squared (m^2); uniform and isotropic. Every vegetated bacteria or virus that we know or have tested requires a dose of < 100 joules/ m^2 for $-1 \log_{10}$ reduction. If you wish I will send the reference since it is well documented and our tests roughly confirm the published values. Hence $>-12 \log_{10}$ reduction (meaningless) would be expected for bacteria and virus. Endospores such as anthrax or C. diff would have about $-2 \log_{10}$ reduction. A 6 second exposure would be required for $-4 \log_{10}$ reduction for these two types of hardy spores. We are working on supplying more optical energy to lower the time for sanitation to 3 seconds. This approach could also be used in the OR for re-sterilization of hands or gloves during surgery and for drastically cutting down peri-operative scrub time.

Validation experiments using UVC have been done on gloved hands by a certified independent lab. The

CDC, NIH, AHRQ will find no issue on the experiments. Each test included multiple test sites on the glove including the spaces between fingers and at the base where fingers come together.

Gloves are opaque to UVC. For bare hands, the skin requires application of a proprietary prophylactic coating that absorbs 99.999% of the incident radiation. The transient pathogens that contaminate the surface of the coating get the full dose and the Stratum Corneum gets 1/100,000 the dose. This allows 500 exposures in 8 hours before the maximum allowed dose to the skin of 60 joules/m² is accumulated. Erythema tests will need to be done but absorption tests make it clear that there will be no erythema. Given that use of alcohol rubs and hand washing does cause erythema, this is a huge advancement in skin health for nurses and doctors. Counter intuitive at first, but clearly the way to go.

I think that developers of UVC based hand hygiene technology have accounted for all adverse effects but surprises are always possible. However, UVC exposure of the skin is common among welders etc and is well documented by OSHA, so there should be no surprises.

Needless to say this approach is one that allows consistency and control, offers broad efficacy, does not depend too much on the healthcare worker, and saves enormous time; even 100 uses per day takes only 5 minutes. (as opposed to 50 minutes of alcohol rubbing). ICPs could expect many informed patients will play a role as CDC teaches by insisting that the box be used before being treated or touched by the HCW or visitor in any way. It also adds another of protection for healthcare workers especially if their gloves have micro pin holes.

Peter Gordon

Germgard Lighting LLC is a medical technology start up focused on solving infection prevention problems. Its innovation pipeline enables a multi-tiered approach to infection prevention that includes cost effective bare and gloved hand sanitation, medical instrument sterilization, surface sanitation, and air sterilization. The Company is funded by the NJ Commission on Science and Technology and US Army Medical Command and is located in the innovation incubator on the campus of the U.S. Army Picatinny Arsenal in Dover, NJ. Its represents an excellent example of a public-private partnership creating local jobs, solving critical healthcare delivery problems, and protecting patients while drastically lowering costs.